Amendments to the Specification

Please replace the paragraph beginning at page 1, line 14, with the following rewritten paragraph:

There is known an induction accelerator, which can be used as a device for the formation of singular electronic relativistic ~~beams~~ beams. Redinato L. "The advanced test accelerator (ATA), a 50-MeV, 10-kA Inductional Linac." *IEEE Trans.,* **NS-30,** No 4, pp. 2970-2973, 1983. This device also is called a one-channel linear induction accelerator (OILINAC). The OILINAC is composed of the injector block, the drive source, output system, and a one-channel linear induction acceleration block. Its peculiarity is that the one-channel linear induction acceleration block is made in the form of a sequence of linearly connected acceleration sections. Each of the acceleration sections is made in the form of magnetic inductors, which are enveloped by a conductive screen. The acceleration of the beam is achieved by the effect of longitudinal vortex high-frequency (tens MHz) electric field, which is generated within the acceleration space of the section. The acceleration space is made in the form of a special break in the conductive screen. Thus, the conductive screen shields the outside of the acceleration section (with respect to its inner part) from the penetration of the vortex electric field. This occurs everywhere within the acceleration section, apart from the special break in the conductive screen, which plays a role of the acceleration interval (accelerative space). The acceleration channel in the OILINAC has a linear form. This is the main cause why these systems are called "linear".

Please replace the paragraph beginning at page 2, line 16, with the following rewritten paragraph:

The other shortcoming of the OILINAC is that[[,]] only one charged particle beam is accelerated on all stages of the acceleration process, i.e., OILINAC is one-channel and one-beam, at the same time. However, a series of practical applications ~~requires~~ require the formation of charged-particle beams with a multi-component structure, for example, the electron beams for the two-beam superheterodyne free-electron lasers, complex (electron-ion or ion-ion) beams for some technology systems, etc. A direct use of the OILINAC in such situations is impossible, since, as it was mentioned before, they are designed for the formation of exclusively one-energy and one-component relativistic beams of charged particles. This means that the OILINAC possesses limited functional possibilities with respect to potential fields of application.

Please replace the paragraph beginning at page 2, line 27, with the following rewritten paragraph:

It is well known that the limitation for the range of beam current strength in the OILINAC exists from the "down" as well as the "upper" sides. The limitation from the "down" side is connected with lower level of its efficiency in the case when the beam current magnitudes are smaller [[then]] than some critical value. For instance, such critical beam current equals ~1 kA for most of the modern electronic OILINACs. This happens because the main power losses in OILINAC are related with the losses in the re-magnetization of the magnetic inductor cores. These losses depend mainly on the core material and they do not depend practically on the beam current strength. On the other hand, the useful power is the power which the beam obtains during the acceleration process. This power, in contrast to the first case, depends on the beam current. As it is widely known, the particle efficiency of the acceleration process can be determined as a ratio of the useful power to the total (i.e., sum of the losses and useful) power. This means that the main reason for the efficiency increase is the increase of the beam current. As experience showed, the power of losses became approximately equal to the useful power in the case when (critical) current beam is ~1 kA. Just owing to this, the modern OILINACs with high level of efficiency are usually characterized by the electron beam current ≥ 1 kA. However, many practical applications require beams with a lower level of current and, at the same time, high efficiency. The mentioned shortcoming reduces essentially the range of the possible practical OILINAC applications.

Please replace the paragraph beginning at page 3, line 19, with the following rewritten paragraph:

There is also known an inductional accelerator, which can work as a device for the formation of relativistic beams of charged particles and which is named the multi-channel induction accelerator (MIAC). Two design versions of the MIAC are known[[.]] ~~Including,~~ including the multi-channel induction linear accelerator (MILINAC) [V.V. Kulish, A.C.Melnyk. Multi-Channel Linear Induction Accelerator, U. S Patent No. 6,653,640 B2; issued Nov. 25, 2003.], and the Multi-Channel Induction Undulative Accelerator (MIUNAC) [V.V.Kulish, P.B.Kosel, A.C.Melnyk, N.Kolcio Induction Undulative EH-Accelerator, U. S Patent No. 6,433,494 B1, issued Aug. 13, 2001]. The latter is also called the EH-accelerator [V.V.Kulish. Hierarchical Methods. Vol. II. Undulative electromagnetic systems. Kluwer Academic Publishers, Boston/Dordrecht/London, 2002]. MIAC consists of the injector block, the drive source, the output device, and the multi-channel induction acceleration block. Here the multi-

channel acceleration block is made in the form of an aggregate (including that placed parallel with one to other) of one-channel linear induction acceleration blocks. Similarly to the OILINAC, each one-channel linear induction acceleration ~~blocks~~ block is made in the form of a sequence of the linearly connected acceleration sections. In turn, each of the acceleration sections is made in the form of one or few magnetic inductors enveloped by [[a]] an individual conductive screen.

Please replace the paragraph beginning at page 4, line 14, with the following rewritten paragraph:

In contrast to the ~~MILINACat~~ MILINAC at least a part of the partial output systems is made in the form of magnetic turning systems. Each of the turning systems connects the output of one of the one-channel linear induction acceleration blocks with an input of other similar block. Only those inputs, which are connected with injectors, and those outputs, which are destined for coming out the accelerated partial beams, are exceptions from this rule. Thus, each of the acceleration channels in the MIUNAC represents by itself a sequence of linear parts (the partial channels within the one-channel accelerative blocks) and turns for the angle 180° (the part of the channel within a turning system). This gives eventually an undulative-like form of the accelerating charged particle beam. That is why the systems of this class are called the undulative.

Please replace the paragraph beginning at page 9, line 20, with the following rewritten paragraph:

The characteristic feature of the design proposed is that the conductive screens 7 are common for a few parallel acceleration sections, which, in turn, belong to different one-channel linear induction acceleration blocks. Owing to this each of the magnetic inductors 6, as it is mentioned above, takes part in forming voltage in each accelerative space of the sections, which are enveloped by common screen. As a result, the voltage, which is acting on beam particles in the accelerative space, forms as a sum of voltages, which are generated by all inductors of this and all neighboring inductors (i.e., the inductors enveloped by a common screen). This means that the voltage in this case turns out to be higher [[then]] than in the case of a prototype, where, as it is mentioned before, a "personal" separate conductive screen envelops each acceleration section. Physical peculiarities of this physical process are illustrated in details in FIGs. 4 - 6.

Please replace the paragraph beginning at page 9, line 32, with the following rewritten paragraph:

The scheme, which illustrates the process of forming strength lines of the electric field generated by inductors of an acceleration section without the conductive screen, is shown in FIG. 4. There 12 are the inner parts of the strength lines, 13 are the magnetic inductors, 14 are the "proper" parts of the outside strength lines, 15 are the "strange" parts of the outside strength lines, <u>and</u> 16 is the charged particle beam (electron, for instance). Accordingly with the relevant Maxwell's equations, the magnetic flux, which circulates within magnetic cores of the inductors 13, generates the vortex electric field. This field is represented in FIG. 4 as a sum of three electric fields, which are pictured by the strength lines 12, 14 <u>and</u> 15, respectively. Including, the inner electric field 12 generates within the inner parts of the inductors 13. Correspondingly, the outside part of the electric field is generated outside with respect to the inductors 13. Therein two types of the outside field can be distinguished. They are the "proper" 14 and the "strange" ones, respectively. The "proper" field 14 is the field, which is generated by a part (the lower in the case of FIG. 4) of inductor in nearest outside space. In contrast, the "strange" field 15 is the field, which is generated in the same place by the remote part (the upper in the case of FIG. 4) of inductor. Thus, it is readily seen, that the resulting outside electric field, in the discussed case of section without conductive screen, always can be determined as a sum of the "proper" and "strange" fields. Both these fields, as it is obviously seen in FIG. 4, are directed oppositely with respect of one to other. This means that the phenomenon of reciprocal compensation of the "proper" and "strange" fields is characteristic for the acceleration sections without the screen (that are characteristic for the prototype). It should be mentioned, however, that the complete compensation of both fields occurs in the area located far from the inductors 13. The particular compensation only has place in the nearest surrounding volume. This circumstance is used in the prototypes for increasing the energy acceleration rate.

Please replace the paragraph beginning at page 10, line 26, with the following rewritten paragraph:

The energy, which the beam 16 ~~obtain~~ <u>obtains</u> under action of the vortex electric field in the discussed case (see FIG. 4), can be determined as a work A, which the inner electric field 12 fulfils under the beam particles: